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AMERICAN JOURNAL OF OPTOMETRY

FOCAL INFECTIONS[1]

Dr. H. D. Pearson
Jamestown, N. Y.

It is a well known fact that hyperopic visual fatigue caused by excessive and constant strain of the ciliary muscles, often results in reflex disturbances such as headache, nausea, etc. Relief of the strain by means of the application of proper lenses will often relieve the reflex symptoms. It is also interesting to note that the elimination, either by treatment or surgery, or certain intranasal, sinus and pharyngeal conditions will often cause a marked improvement in vision. I have been fortunate in that my association with optometrists has allowed me to keep an accurate record of patients' vision both before and after pathology of the ear, nose, throat and sinuses has been removed. Patients being referred to me for treatment and then back to the optometrist for correction. The patient is told in plain, simple words that pathology of the ear, nose, throat and sinuses may effect the vision. It is explained to them that the removal of the pathology will assure them a more complete and permanent correction of the visual error. They appreciate this because they are looking for relief which will be as near permanent as possible. The reaction is favorable to the optometrist because it will make the results of his refraction more satisfactory. Outside of the physiological changes over which we have little or no control the correction given the patient is reasonably sure to give satisfactory results since the causative pathology has been removed.

It is my contention that the optometrist is not inferior but far superior to the ophthalmologist who uses the cycloplegic method of refraction. This is a reasonable conclusion when we consider that any method used to correct deviations from the normal in any part of the body should be as near like nature's own methods as possible. Since my training has been along drugless lines it may be thought

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that I am expressing a biased opinion. If I based my opinion on theory there might be some foundation for such an accusation. Results either make or break any system of therapy and it is upon results which I have observed that prompts my statement.

There is only one logical reason why the ophthalmologist should be considered superior to the optometrist and that has nothing to do with the actual fitting of glasses. Because the ophthalmologist examines his patients for pathology of the head and neck and realizes the connection between this pathology and visual errors he may be better able to prepare his patient for the correction by glasses. Right there is where his advantage over the optometrist ends. From then on, if he uses cyclopegics he is working against nature.

It is not my intention to tell you that Optometry is not complete as it is practiced today. It is most complete and thoroughly efficient in the diagnosis and correction of visual errors. Personally, I would like to see every optometrist have a working knowledge which will enable him to recognize pathological conditions which may be contributing causes to visual errors. In the next few paragraphs I wish to tell you why I make this statement.

We are not going to enter into a detailed discussion of head infections. The thing we are interested in is a more or less generalized discussion which will enable us to connect up the effects of pathology of the head and neck which changes the visual acuity.

It has been stated that 75% of diseases have their origin or contributing origin in that area of the body above the shoulders. We can realize the possibility of this statement being correct when we consider the possibilities for infection which are presented by this area. These possible points of infection are: the teeth, which normally number 32; six major sinuses; 2 faucial tonsils; 2 lingual tonsils and the post-pharyngeal tonsil or adenoid.

There are four great divisions as to the etiological factors which may lead to morbid changes in the eye: 1. Physical; 2. Mechanical; 3. Chemical; 4. Parasitic—or any combination of the four.

These divisions could have many sub-divisions and it is a small part of the third or chemical division which we want to consider.

Focal infection has run wild in discussions of morbid conditions in all parts of the body. It has butted into the eye and is there to stay because it has a proven niche in scientific therapeutics. The consideration given focal infection has had a peculiar history. At first it was discredited by most of the profession. Then it went through a period of being called the cause of almost every disease to which the human body is susceptible. Today we believe we can give it an unbiased consideration especially as regards the eye, because it produces a definite, somewhat characteristic lesion in the tissues of the eye which it involves.

We can get a clear picture if we know what we mean by focal infection and how it works. The absorbed toxic products of a local-

ized septic infection in any part of the body, *i. e.*, teeth, nose, and accessory sinuses, ear, throat, gall-bladder, appendix or any abscess forms a common ground for the development of a focal infection. If we add the systemic infections of such diseases as syphilis, measles, scarlet fever, tuberculosis, etc., we could go on indefinitely naming the means by which toxic materials can be formed which may affect the eye. For our discussion we will confine our focal infections to the area which concerns us most, *i. e.*, the effect upon the eye from infections arising from the nose, throat, teeth and head region.

There are two types of infection which we have to deal with. They are:

1. Focal infection, which occurs on the skin or invaginated portions of the body.

2. Specific infections which enter from outside the body.

The foci of infection means the point of infection. Focal infections are secondary infections which result from a primary foci which becomes disseminated through the body. If we will remember this we will know that many of the so-called focal infections are misnamed and these misnomers are being used promiscuously. You have heard of a boil being called a focal infection. This is not true because a boil is a primary infection and a focal infection is secondary—always. A staphlycoccic infection forms a circumscribed area of inflammation containing pus. It is not secondary so is not focal. The primary foci of infection may become disseminated through the body, becoming a secondary or focal infection and produce all the secondary or focal infection and produce all the secondary lesions to which the human body is susceptible. It can and does produce rheumatism, neuritis, nephritis, and countless other itises. Itis is itis whether it is on your head or on your toe and must be treated as such.

The two different types of infection occurring in teeth will illustrate the difference between the foci of infection and focal infection. A root abscess is a circumscribed area of inflammation containing pus and is so walled off that the products of the infection are not distributed through the body. The chances are that it is going to follow the lines of least resistance and break and drain along the side of the tooth. This is a primary foci of infection. The infection occurring at the root and not walled off, is a secondary condition and drains directly into the blood stream. This is the secondary infection or focal infection. This type of infection may not cover a large area but it is not the size that counts. Death has resulted from the removal of a tooth having this type of infection. This does not mean that no effort should be made to remove this type of infection because death is liable to occur as the result of absorption.

As early as 1868 the relationship between bad teeth and eye troubles was demonstrated. An examination of 100 toothache suf-

ferers showed that 73 cases had a decrease in accommodative ability. This was explained by the increase in intra-ocular pressure which was due to irritation, but the toxins produced by the infection, to the secretory nerve apparatus. This produced a condition not unlike the prodromal stages of glaucoma. Later other workers showed—to their own satisfaction at least—that spasm of the extrinsic muscles of the eye could be caused by infected teeth, due to the nerve endings of the trigaminus being irritated. The evidence presented in these cases was entirely clinical and was not substantiated by laboratory and X-ray findings. Nevertheless the clinical proof presented has a certain amount of substantial reasoning as a background.

In 1919 Wirty considered Iritis, both acute and chronic, as being caused by a bad oral condition. He claimed that this resulted from the infection being carried through the veins, particularly through the venous plexuses of both organs which have the same outflow—through the pterygoid plexus and the anterior facial vein. This, with the opthalmic vein connects the venous plexus of the orbit with the numerous outlets of the teeth. It was estimated that 25 to 30% of cases of iritis were caused by focal infection. This in view of the fact that 95% of people suffer from some type of dental trouble. These conclusions were also arrived at through clinical evidence presented.

We believe that we can now place our conclusions on a more sound and definite basis. One experiment will serve to show the methods used and the results obtained. Cultures were obtained from one or more teeth of patients suffering from metastatic eye conditions (infections). Sixty-eight rabbits were injected intavenously and isolated. Sixty-eight percent of the rabbits developed eye lesions such as iritis. This would naturally lead us to believe that the infection was carried through the blood stream. If this is true we must explain either that these certain bacteria have a marked affinity for the eye or we must explain the lowered resistance of the eye tissue which allowed the infection to assert itself and become active. The first part—the marked affinity—can only be partly explained because staph and strop, gonnococcus and the tubercle bacilli are the principle offenders and they can not be said to have any marked affinity for the eye. The second theory can be explained by the Osteopathic theory as to the cause and predisposing cause of disease. That is impaired circulation, due to mechanical deviations which cause a lowered resistance of the tissues affected, thus allowing the infectious process to become active.

We know that ocular disturbances have developed in the presence of an acute cold or an acute exacerbation or a long standing nasal disease. The ocular disturbance will clear up with proper treatment of the nasal pathology which indicates that the nasal pathology is the primary etiological factor in producing the disturbance.

Chronic constipation is still another condition which is only too common and which may bring about a change in ocular balance.

The toxins produced from the accumulated fecal matter will cause a muscular spasticity. Questioning the patient will usually disclose the presence of a chronic constipation.

The conditions of the head which may give rise to ocular disturbances can well be included in the examination by the Optometrist. Blocked sinuses, general mucosal inflammation of the nose and throat, hypertrophied, imbedded, infected tonsils, deviated catarrh are some of the conditions which should be noted and can be noted to advantage by every optometrist.

Efficiency is the keynote of success in business and professional life. Optometry has met the demand for efficiency in the correction of visual errors. Its success is evidenced by its advancement. To include in its practice the recognition of pathology other than eye pathology will not only prevent the unfortunate situation of trying to overcome impossible odds but it will enable the Optometrist to give satisfaction under what we might now consider unfavorable conditions. The practical points of any other lines of practice which may have a direct bearing upon your specialty should be considered as fully as possible in your practice.

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1. Lecture Delivered at the 33rd Annual Convention of the New York State Optometric Association, Jamestown, N. Y., May 28th, 1928.

PSYCHOTHERAPEUTICS IN THE PRACTICE OF OPTOMETRY

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In general terms, it is the province of Optometry and Optometrists to use any means other than drugs that will serve the purpose of conserving and restoring human vision. To many of us, the scope of our work, while giving immense personal satisfaction, has seemed considerably circumscribed. Optimistically, one can hold that a work of such great importance is justly limited, so that maximum perfection through greater concentration may result—nay, must result. That is the ultimate desideratum of specialization.

Perhaps I, for one, should have been content with such a philosophy had not chance put into my hands a work entitled "Psychotherepeutics in the Treatment of Nervous Disorders," written by an eminent French authority, M. DuBois, the reading of which I cheerfully recommend to all of you, because I think it will have an important persuasive force in directing your efforts to accomplish for your patients much good in an inexpensive, easy manner, through an application of Doctor DuBois's precepts, as I shall subsequently endeavor to show.

There are probably few optometrists today who are not aware of the intimate relation that exists between Optometry and its proper practice, and Physics, Psycho-physics, and pure Psychology. We see this relationship in the phenomena of binocular vision, in thing, depth, space and color-contrast perceptions. We are more or less aware of the illusions due to reflection and refraction as they occur in seeing and hearing. In our work as optometrists, we try to overcome the habit factor, properly so called, arising through erroneous associations and wrongly interpreted experiences.

These apparently cold intellectual considerations of a problem fall short of solution of many a patient's troubles, however, if the emotions, and their causes and effects, are looked at with indifference or not at all considered. It must be evident that a disordered physiology or an organic lesion can and does disrupt the normal mental equilibrium. Conversely, it is just as evident that a disturbed mental equilibrium can and does defeat a recovery from a disordered physiology or from an organic lesion. Here, apparently, we have a vicious descending spiral state of affairs (I do not see it as an end-

less chain or closed circle). Obviously, then, the repair of the physiology, only, leaves something of considerable value undone in many cases, **i.e.,** the attempt to return the patient to mental equilibrium and self-confidence.

Let it not be assumed that there is a relatively small number of people who become neuresthenics, hypochondriacs, or melancholics, even the last of which may have had its incipiency in a perverted ocular physiology. The dread of blindness, undispelled, in any of these people, is a serious matter indeed. One has but to consider the growing number of psychiatrists, alienists, pschopathologists, and their like, to know that the demand must be large for their function and support.

Now, I do not pretend to know the methods of treatment of the several classes of mind specialists. I do recognize, however, the value and the excellent results to be had from an application of the common sense method of Dr. DuBois. So far as I am able to discern, the "psychotherepeutics" consist of nothing more than pointing out to the patient that, admitting his distress to be very real, it is nevertheless due to allowing his mind to dwell constantly on his own troubles whose origin is a creation of the mind itself, or of the disturbed function of some part of the body; that by showing the patient some of the ordinary illusions which occur to everyone, he may be made to realize how the mind can play tricks or create false alarms. Dr. DuBois shows the patient that mental contentment is then a matter of choice; that by cultivation of the will to suppress the habit of self-contemplation, knowing the reason therefor, the patient may be led to a healthy optimism. If persuasive suggestion necessitates lying, the end surely justifies the means. May I quote, perhaps at some length, Dr. DuBois's own views:

"I have shown how useful in this domain of internal medicine and bodily sickness one might find a psychotherapy that was governed by tact and kindness. Doubtless it is still nothing more than a palliative, like many medicines; but it can be applied to that element of suffering which constitutes the whole of the disease as far as the patient is concerned. That is why—although, as a matter of fact, the prognosis depends upon the lesion, and although moral influence does not cure—it is in such psychic therapeutics that the physician finds the most powerful means to relieve and console and to hasten cure.

"Along with those somatic affections which constitute the domain of internal medicine there is a group of diseases which have been called psychoneuroses, and which I have had chiefly in mind in this work. These psychoneuroses are psychopathics. They are bounded on the one side by the insanities, on the other by what we call the normal condition. There is scarcely any more danger of these patients degenerating into insanity than there is for healthy men developing neurasthenia. Placed at the middle of the ladder,

or still lower yet, the nervous patients have more chance of returning to the normal state than of progressing toward insanity.

"These psychopathic conditions are legion. They may occur singly, forming an imitation of morbid entities, such as neurasthenia, hysteria, hystero-neurasthenia, hypochondria, and melancholia, and conditions of disequilibrium degeneracy; they are continually mingling themselves in the symptomatology of all surgical and medical diseases, and in human suffering under all its forms and in all its degrees.

"In neurasthenia we find general debility; sometimes it is physical, sometimes intellectual, but, above all, it is moral. Our endeavor is to raise up these patients, to give them confidence in themselves, and to dissipate their fears and their autosuggestions.

"In the great majority of these cases we can reach this end by moral influence. If we find, along with mental stigmata, certain somatic complications, we ought to combat them by hygiene and physical measures and medicines. But we must be careful to tell the patient that these physical therapeutics have no direct action on the moral trouble. Much more, if it is only a question of functional troubles following the fall of the psychic barometer, take care to treat these symptoms by efficacious means. The neurasthenic ought to know clearly that he is psychopathic, and not sick in his body. One can tell him this without hurting his feelings and without upsetting him. I have said that this psychotherapy pure and simple is facilitated by favorable conditions, such as isolation, rest and overfeeding. But one ought not, as is often the case, to confound the curative agent with the auxiliaries which favor its action.

"* * * The only thing that will assure the future of the patient is a rational moralizing psychotherapy which will change the psychopathic mentality which has determined the symptoms.

"To cure hysterics the physician must be still more firm in his course; he must not fear to be extreme in his views concerning the pathogeny. When he is with patients imbued with their autosuggestions, he must get at the keynote of their trouble and find out how to get hold of it. This ought to be the fundamental idea. Everything in hysteria proceeds from mental representation * * *. With an hysterical person one must act as with an epileptic who comes out of a trance; one must not stare at him or jump up quickly, or speak to him roughly. One must learn not to change one's position, and to put a question gently without raising the voice, in such a way that the wakening does not take place roughly * * *.

"There are also some unbalanced people who have to be morally supported if they are to be freed from their manias, obsessions and fears. To propose treating these mental patients by baths, douches, electricity, and cacodylate of soda is just as absurd as to give digitalis to a person who has palpitation of the heart at the sight of a dog; it would be much better to prove to him that dog does not bite.

"Undoubtedly, this kind of work is difficult, and not all patients can be cured. But it is the only way. The physician has nothing to help him but his concise, imperturbable, and kind utterances. All such psychoneurotics ought to be brought back to a healthy life and to the requirements of physical, intellectual and moral hygiene.

"* * * True hygiene is much more simple; it consists, first of all, in letting one's self live with unshaken confidence in one's resistance * * *. I have no fear of overstrain, whether it be physical or intellectual, if it is only free from the emotional element which is the result more than anything of ambition. I prefer intellectual and moral development to sport, which makes athletics and not men * * *. It is the sound mind which the more often creates the healthy body, not that it suppresses actual disease, but because it gives us strength to neglect our diseases and to live as though they did not exist.

"It is in their own education that patients ought to seek their cure, and that people in good health should find their safeguard against nervousness. One ought to begin by little things in the excellent habit of neglecting one's trifling ailments, and of going gravely forward without being too much concerned for one's comforts."

Is there any professional man, concerned with the physical and mental welfare of their patients who has not encountered "cranks," neurasthenics, hypochondriacs—even melancholics? They are disliked and get small sympathy, usually. They are given little or no aid in the directions heretofore outlined. The responsibility, a very grave one, I believe, most often is not properly met in these instances. A kind, considerate attitude, the willingness to make a sympathetic explanation, or a thoughtful recommendation (persuasive recommendation) can, as I see it, obtain for many a sufferer much happiness and comfort that might otherwise be denied him indefinitely; it may help to stabilize the thinking faculties of a great number of hypochondriacs, and avoid the suicidal tendencies of melancholics. It is only recently that we in Philadelphia read of a girl, no doubt a melancholic, preferring suicide to wearing glasses constantly: Is it not obvious that the doctor failed in his duty?

Restoring and conserving human vision is a fine work. Gaining for many a happier frame of mind may avoid useless surgery, even save life, and make for better civic and national stability.

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A FEW CONCLUSIONS AS DRAWN BY SIR ISAAC NEWTON FROM HIS MEMORABLE WORK ON "LIGHT," WRITTEN IN 1675, AND PUBLISHED IN 1704.[1]

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In the closing chapters of his book on Light, Sir Isaac concludes by saying that "When I made the foregoing observations I designed to repeat most of them with more care and exactness, and to make some new ones for determining the manner of how the rays of Light are bent in their passage by Bodies for making the fringes of Colours with the dark lines between them. But I was then interrupted, and cannot now think of taking these things into further consideration. And since I have not finished this part of my design, I shall conclude, with proposing only some Queries in order to a further search to be made by others.

"Query 1. Do not Bodies act upon Light at a distance, and by their action bend its rays, and is not this action *caeteris paribus* strongest at the least distance?

"Q2. Do not the rays which differ in refrangibility differ also in flexibility, and are they not by their different inflexions separated from one another so as after separation to make the Colours in the three fringes above described? And after what manner are they inflected to make those fringes?

"Q3. Are not the rays of light in passing by the edges and sides of bodies, bent several times backwards and forwards, with a motion like that of an eel? And do not these fringes of coloured Light above mentioned, arise from three such bendings?

"Q4. Do not the rays of Light which fall upon Bodies, and are

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[1][This is the last of four papers inspired by the undoubtedly interesting persual of Sir Isaac Newton's book, "LIGHT." In this the Author uses, in giving us Newton's comments, his approximate language, but not the exact spelling or wording as used by Newton in the later end of the Seventeenth Century.]—EDITOR, AMERICAN JOURNAL OF OPTOMETRY.

reflected or refracted, begin to bend before they arrive at the Bodies; and are they not reflected, refracted and inflected by one and the same Principle, acting variously in various circumstances?

"Q5. Do Bodies and Light act mutually upon one another, that is to say, Bodies upon Light in emitting, reflecting, refracting, and Light upon Bodies for heating them and putting their parts into a vibrating motion wherein heat consists?

"Q6. Do not black Bodies conceive heat more easily from Light than those of other colors, do, by reason that the light falling upon them is not reflected outwards, but enters the Bodies, and is often reflected and refracted within them, until it be stifled and lost?

"Q7. Is not the strength and vigour of Light and sulphurous (we infer that this word would not be spoken of as "phosphorescent" or emitting heat without light) Bodies observed above, one reason why sulphurous bodies take fire more readily, and burn more vehemently, than other Bodies do?

"Q8. Do not all fixed Bodies when heated beyond a certain degree, emit Light and shine, and is not this emission performed by the vibrating motions of their parts?

"Q9. Is not Fire a Body heated so hot as to emit Light copiously? For what else is a red hot Iron than Fire? And what else is burning coal but red hot wood?

"Q10. Is not Flame a vapor, fume, or exhalation heated red hot, that is so hot as to shine? For Bodies do not flame without emitting a copious fume, and this fume burns in the flame. The *Ignius Fatuus* (will-o-the-wisp) is a vapour shining without heat, and is there not the same difference between this vapour and flame, as between rotton wood shining without heat and burning coals of fire? In distilling hot spirits, if the head of the still be taken off, the vapour which ascends out of the still will take fire at the flame of a Candle, and turn into flame, and the flame will run along the vapour from the Candle to the still. Some bodies heated by motion or fermentation, if the heat grows intense fume copiously, and if the heat be great enough the fumes will shine and become flame. Metals in fusion do not flame for want of a copious fume, except Spelter (zing) which fumes copiously, and thereby flames. All flaming bodies as oil, tallow, wax, wood, fossil coals, pitch, sulphur, by flaming waste and vanish into smoke, which smoke, if the flame be put out, is very thick and visible, and sometimes smells strongly, but in the flame loses its smell by burning, and according to the nature of the smoke the flame is of several Colours, as that of Sulphur blue, that of Copper opened with that of Sublimate green, that of Tallow yellow. Smoke passing through flame cannot but grow red, and red hot smoke can have no other appearance than that of flame.

"Q12. Do not the rays of Light falling upon the bottom of the Eye excite vibrations in the *Tunica Retina*? Which vibrations, being propagated along the solid fibres of the optic nerves into the Brain

cause the sense of seeing. For, because dense bodies conserve their heat for a long time, and the densest conserve their heat the longest, the vibrations of their parts are of a lasting nature, and therefore may be propagated along solid fibres of uniform matter to a greater distance, for conveying into the Brain the impressions made upon all the Organs of sense. For that motion which can continue long in one and the same part of a Body, supposing the Body homogeneal, so that the motion may not be reflected, refracted, interrupted or disordered by any unevenness of the Body.

"Q13. Do not several sorts of rays make vibrations of several bignesses, which according to their bigness excites sensations of several Colours, much after the manner of the vibrations of the Air, according to their several bignesses excite sensations of several sounds? And particularly do not the most refrangible rays excite the shortest vibrations for making a sensation of deep violet, and the least refrangible for making a sensation of deep red, and the several intermediate sorts of rays, vibrations of several intermediate bignesses to make sensations of the several intermediate Colours?

"Q14. May not the harmony and discord of Colours arise from the proportions of the vibrations propagated through the fibres of the optic Nerves into the Brain, as the harmony and discord of the sounds arises from the proportions of the vibrations of the Air? For some colours are agreeable, as those of Gold and Incico, and others disagree.

"Q16. Are not the Species of Objects seen with both Eyes united where the optic Nerves meet before they come into the Brain, the fibres of both sides uniting there, and after union going thence into the Brain in the Nerve which is on the right side of the Head, and the fibres on the left side of both Nerves uniting in the same place, and after union going into the Brain in the Nerve which is on the left side of the Head, and these two nerves meeting in the Brain in such a manner that the fibres make but one entire Species of Picture, half of which on the right side of the Sensorium comes from the right side of both Eyes, through the right side of both optic Nerves to the place where the Nerves meet, and from thence to the right side of the Head into the Brain, and the other half on the left side of the Sensorium comes in like manner from the left side of both Eyes. For the optic Nerves of such animals as look the same way with both Eyes (as of Men, Dogs, Sheep, Oxen) meet before they come into the Brain, but the optic nerves of such Animals as do not look the same way with both Eyes (as of Fishes and of the Chameleon) do not meet, if I am rightly informed.

"Q16. When a Man in the dark presses either corner of his Eye with his Finger, and turns his Eye away from his Finger, he will see a circle of Colours like those in the Feathers of a Peacock's Tail. Do not these Colours arise from such motions excited in the bottom of the Eye by the pressure of the Finger, as at other times are excited by Light for causing Vision? And when a Man by a

stroke upon his Eye sees a Flash of Light, are not the like Motions excited in the Retina by the stroke?"

While the expressions are quaint and the conceptions of some of the problems crude, it comes as a distinct surprise that an original investigator could often have guessed so closely to truths which have required over two centuries to develop scientifically. In fact, many of the propositions submitted, as well as a great many interlinear suggestions which appear in the few pages I have copied accurately from this momentous work, point to fields of investigation which we have yet left untouched.

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OCULAR PSYCHOMETRY

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CHAPTER 11.

Any discourse on methods employed in the correction of ocular anomalies must of necessity emphasize philosophy rather than means, with the result that practical minded readers are sometimes prone to consider the entire discussion a mere fabrication of theories. The foregoing chapters of this series of papers on myoculator technic have not mentioned specific cases. This chapter is devoted to analyses of of actual cases, and the principles applied in their correction by practicing optometrists, reported from all sections of America.

Details of devices, means, and methods employed are not herein given, but a complete report of each case referred to, together with the name and address of the doctor reporting it are in the writer's possession. These names may be secured upon application to them if desired.

The cases presented here have been selected as fair examples of correct principles, aptly applied. That some of the results set forth are unusual in the experience of the average optometrist is not denied. Some of the cases are in themselves unusual, but it is to the credit of the profession that doctors of optometry have correctly and successfully determined and applied the proper corrective measures. Considering the cases which are more commonly encountered in optometric practice, results which may seem exceptional to many readers are not so considered by those who have become familiar through practice with the methods described in our previous chapters.

For the reader's convenience in study, the cases are presented in under the name of the anomaly which each typifies.

Case 1. Amblyopia exanopsia and Esotropia in a Child

Patient—"P. G."—Age 7.
Old Rx O. D. plus 3.00 D. Sph. ⊃ plus 1.25 D. Cyl. axis 100.
O. S. plus 3.00 D. Sph.
Acuity with old Rx (worn two years) O. D. 20/200, O. S. 20/20.
New Rx O. D. plus 3.75 D. Sph. ⊃ plus 2.00 D. Cyl. axis 90.
O. S. plus 4.00 D. Sph. ⊃ plus 0.50 D. Cyl. axis 75.

Acuity with new Rx O. D. 20/200, O. S. 20/20.
Convergent strabismus of O. D. 45°.
Fixation with O. D. could not be maintained.

Treatment: One week of daily treatment consisting of simultaneous stimulation of direct and indirect vision; and in fixating and orienting a rhythmically moving target, left eye occluded. Result—fixation maintained, orientation accurate, acuity O. D. 20/50.

Second week (no especial attention paid amblyopic eye) fixation target rhythmically moving to demand full vergence movements in all directions, visible to each eye in turn at rhythmic intervals (to break suppression of O. D. with O. S. open) until diplopia was possible; then, 45 prism diopters base-out (during training only) to prove fusion possible.

Third week (no especial attention paid amblopic eye during first of week). Each eye given a target to follow which was invisible to the companion eye, both targets moving rhythmically through same excursions, until orthophoria was established; then eight prism diopters base-in used during exercises only until exophoria appeared. Patient now urged to fuse.—Acuity of O. D. now 20/40.

Fourth week—Resumed stimulation of indirect vision with rhythmically moving target while attention was held voluntairly to direct vision. Results—O. D. 20/40 plus. Orthophoria constant. Fusion good.

Fifth week. Treatment same as of third week. Results—Orthophoria. Fusion normal. Acuity 20/20 O. D. and O. S.—(Dr. B. E. K.)

[Note:—The principle of rhythmical alternations of light and darkness was not specifically applied in this case. Compare results to those of Case 2.—Dr. Carl F. Shepard.]

Case 2. Amblyopia exanopsia in Youth

Patient—"C. N."—Age 20.
Old Rx O. D. plus 0.75 D. Sph.
O. S. plus 3.25 D. Sph. ⊃ plus 0.75 D. Cyl. axis 180.
Worn three years, checked within a year by doctor reporting case.
New Rx O. D. plus 0.50 D. Sph.
O. S. plus 3.25 D. Sph. ⊃ plus 0.75 D. Cyl. axis 180.
Acuity with old Rx O. D. 20/20—O. S. 20/100.
Acuity with new Rx O. D. 20/15—O. S. 20/100.

First day of treatment (two periods daily—morning and afternoon, 15 minutes each, alternate light and darkness combined with stimulation of indirect vision with rhythmically moving light while attention was voluntarily held to direct vision. Result—acuity O. D. 20/15; O. S. 20/40.

Second day—Same corrective principles applied, giving acuity O. D. 20/15; O. S. 20/30.

Third day—Same as above, with addition of full vergence movements (following moving fixation targets, visible first to one eye then the other). Giving acuity O. D. 20/15; O. S. 20/20.

Fourth day—Same exercise as day before.—O. D. 20/15; O. S. 20/15.—(Dr. O. M. M.)

Case 3. Post Operative Convergent Strabismus With Amblyopia exanopsia

Patient—"A. H."

Convergent strabismus 30° O. S. Straightened once by double operation. Stayed straight six months, then turned in again.

Worn glasses 10 years.

Present Rx O. D. plus 3.00 D. Sph. ⊃ plus 0.50 D. Cyl. axis 90.
O. S. plus 4.00 D. Sph. ⊃ plus 2.00 D. Cyl. axis 90.

Acuity with Rx O. D. 20/30; O. S. 20/100.

Treatment: 20 minutes daily.

First ten days: O. D. occluded. Alternate light and darkness to O. S. only. Full excursions of O. S. following rhythmically moving target in all directions. Result—acuity O. D. 20/30; O. S. 20/60.

Second 10 days. Each eye given a target invisible to the other, both targets moving through same excursions. Results—acuity O. D. 20/30; O. S. 20/30; orthophoria and fusion good. Positive reserve 20/16. Negative reserve 26/18.—(Dr. R. M. H.).

Case 4. Partial Atrophy of Optic Nerve With Divergent-Squint of 40°

Patient—"B. L."—Age 18.

Accident at age of 3 caused paralysis of right side and deviation of O. D., also damage to retina of each eye, probably a retinal detachment.

Old Rx O. D. plano.
O. S. plus 0.25 D. Sph. ⊃ plus 0.50 D. Cyl. axis 90.

New Rx O. D. (impossible to determine).
O. S. plus 0.75 D. Sph. ⊃ plus 0.50 D. Cyl. axis 90.

Acuity O. D. 20/300; O. S. 20/25.

Treatment: Rhythmic alternation of light and darkness (O. S. occluded) 10 minutes daily. Also attempts to develop fixation and orientation by means of rhythmically moving, appearing and disappearing target. Acuity after 30 days with temporary Rx (approximating final Rx) O. D. 20/200; O. S. 20/25.

Second thirty days, each eye given target invisible to the other, both targets moving through identical excursions. Results—Final Rx O. D. plus 2.00 D. Sph. ⊃ plus 0.75 D. Cyl. axis 90; O. S. plus 0.75 D. Sph. ⊃ plus 0.50 D. Cyl. axis 90. Acuity O. D. 20/100; O. S. 20/25 with orthophoria.—(Dr. W. D. R.)

Case 5. Pseudo Myopia and Esophoria

Patient—"J. C."—Age 22.

Old Rx. minus 2.75 D. Sph. O. U. used 2 years.

New Rx (indicated) —4.00 D. Sph. O. U.

5 diopters esophoria at 20 feet, 2 diopters esophoria at 16 inches, with and without Rx. Fusion poor.

Treatment 3 times weekly. Twelve periods consisting of full vergence movements in fixation of a rhythmically moving target. Results—Rx reduced to —2.75 D. Sph. O. U., giving an acuity of O. D. or O. S. 20/20. Esophoria gone.—(Dr. C. H. J.)

[Note:—Although the diagnosis of progressive myopia would be disputed in this case, many similar cases have been so called, and treated as such by over correcting the myopia.—Dr. Carl F. Shepard.]

Case 6. Myopia With Exophoria and Presbyopia

Patient—"R. N."—Age 51.
Old Rx —1.50 D. Sph. ⊃ 5 prism diopters, base-in. O. U.
Add O. U., plus 2.00 D. Sph. for reading.
Acuity 20/20 with old Rx.
Exophoria 15 diopters.

Seven treatment periods; each eye following a rhythmically moving target invisible to companion eye, targets moving through parallel excursions. Results—exophoria gone. New Rx —1.00 D. Sph. O. U. with plus 1.75 D. Sph. add. Acuity 20/20.—(Dr. E. D. G.)

Case 7. Myopia in One Eye, Ptosis and Amblyopia

Patient—"T. D."—Age 21.
Old Rx. O. D. plus 0.50 D. Cyl. axis 90.
O. S. plano.
Acuity O. D. 20/20; O. S. barely light perception.
New Rx (retinoscopy) O. D. plus 0.50 D. Cyl. axis 90.
O. S. —5.00 D. Sph.
Acuity O. D. 20/20; O. S. barely light perception.

After five daily periods of alternate light and darkness treatment patient could see and fixate a spot of light in a darkened room. After ten treatment periods in following a rhythmically moving light through all excursions the acuity of vision in O. S. was 20/100. Ten more treatment periods applying same principle enabled the examiner to prescribe O. D. plus 0.50 D. Cyl. axis 90; O. S.—0.50 D. Sph. Acuity of O. S. was 20/80 and the ptosis was gone.—(Dr. C. P. W.)

Case 8. Paresis of Left External Rectus Following "Flu" and Infection in Left Ear

Patient "X" (Male)—Age 17.
Acuity 20/20 each eye.
Rx neglible.

Left eye turned out 95 prism diopters. Could not be turned nearer straight ahead. Head turned to right to avoid diplopia.

Treatment: First week, 5 to 10 minute periods 5 or 6 times daily, right eye occluded, left eye following a rhythmically moving fixation target movement of which was increased as the eye's ability to follow it improved. Deviation reduced to 65 prism diopters.

Second week: Same training daily. Deviation reduced to 45.

Third week: Each eye given moving target invisible to com-

panion eye, both targets moving through parallel excursions. Binocular fixation now maintained except beyond 35° to the left.

Fourth week: Rest. No treatments.

Fifth week: Rhythmically moving target, visible to both eyes part of the time, then to first one eye then the other part of the time; the effect of prism base-in up to 10 prism diopters, then of the same amounts base-out, being used as an inhibitive to fusion. After third day of fifth week fusion and orthophoria in all vergence positions.

—(Dr. B.)

Case 9. Exophoria

Patient—"G. W."—Age 13.

Acuity 20/30 each eye.

Rx (old and new) minus 0.75 D. Sph. ⊃ plus 1.75 D. Cyl. axis 90, O. U.

50 prism diopters of exophoria since 8 years of age.

Patient has been under this doctor's care for several years during which the application of permanent prisms and oculo prism treatments were tried without success.

June 21st began treatments employing principles as described in the foregoing chapters. Daily treatment periods of 15 minutes each.

First two days, rhythmically moving target visible to first one eye, then the other, to avoid suppression. Next seven days, each eye given a target invisible to the companion eye, both targets moving rhythmically through identical excursions. Tenth day of training, exophoria entirely gone, fusion good.—(Dr. B. E.)

Case 10. Esophoria

Patient—"J. W."—Age 5.

Old Rx, ten varieties, none comfortable.

New Rx plus 0.50 D. Sph. O. U.

15 prism diopters esophoria.

Treatment: Fourteen daily treatment periods of ten minutes each; a plus 2.50 D. Sph. O. U. worn during treatment, rhythmically moving fixation target visible first to one eye then to the other. Esophoria, and discomfort entirely gone.—(Dr. F. G.)

Case 11. Left Hyperphoria

Patient—"J. A. G."—Age 64. Head tilted.

Old Rx O. D. plus 0.75 D. Sph.; O. S. plus 1.00 D. Sph. ⊃ 12 prism diopters, base down.

Acuity 20/20 (prescribed by doctor reporting).

Treatment: Four times a week for two months. Rhythmically moving target visible first to one eye then the other, followed by target for each eye invisible to companion eye, both targets moving rhythmically through identical excursions. "All muscular imbalance disappeared, head straight, and patient delighted." New Rx plus 1.50 D. Sph. O. U.—(Dr. D. A. M.)

Case 12. Development of Fusion in a Post Operative Case

Patient—"Miss K."—Age 16.

Acuity 20/20 each eye. Rx (old and new) plus 1.00 D. Cyl. axis 90, O. U.

Case taken 8 months after advancement operation on both external rectii. Deviation not visible, but diplopia constant. Three treatment periods, 20 minutes each, following rhythmically moving, fixation target visible first to one eye then to the other stopped complaints of diplopia. Five periods of 15 minutes each following rhythmically moving target visible to both eyes, gradually introducing prism power, developed normal "ductions." Three more treatment periods developed normal steropsis.—(Dr. R. W. H.)

Case 13. A Case of Partial Color Blindness

Patient—"M. S."—Age 10.

Can not pick reds and greens from yarn test.

Acuity 20/100 each eye. Rx plus 1.50 D. Sph., O. U.

Treatments prescribed to improve acuity of vision: Three periods of ten minutes each, rhythmically moving red and green fixation targets visible to first one eye and then the other, resulted in ability to pick out some of the reds. Four more periods as above with an additional ten minutes stimulating indirect vision with moving targets while attention was voluntarily held to direct vision, resulted in ability to pick out all of the reds and some of the greens.

—(Dr. H. E. C.)

[Note:—The unexpected results in this case have led Dr. M. K. to experiment with color blind patients and while he is not yet ready to publish results, he has reported excellent results in three cases.—Dr. Carl F. Shepard.]

Case 14. Nystagmus

Patient—"H. F."—Age 15.

Rx. O. D. plus 0.75 D. Sph. ⊃ plus 0.50 D. Cyl. axis 90.
O. S. plus 1.00 D. Sph. ⊃ plus 1.00 D. Cyl. axis 90.

Acuity 20/20.

Nystagmus following "spells of intestinal hemorrhages" in early childhood.

Three treatment periods (time of each not given) attempting to fixate and follow a slowly, rhythmically moving fixation target; speed and extent of movement increased with ability of eyes to follow; resulted in "no trace of oscillation."—(Dr. H. W. F.)

Case 15. Alternating Divergent Strabismus

Patient—"H. B."—Age 19.

Acuity 20/20 each eye.

Rx plus 0.37 D. Sph., O. U.

Four days' treatment fixation and orientation of moving target, left eye occluded (twenty minutes each day). Five daily periods of the same treatment with right eye occluded. Three fifteen minute

periods following a rhythmically moving fixation target visible first to one eye then to the other. Three twenty minute treatment periods, each eye given a target invisible to the companion eye; both targets moving rhythmically through circular excursions. Result: Orthophoria, normal fusion and "ductions."—(Dr. R. W. H.)

Space does not permit individual mention of many types of cases where minor anomalies have been eliminated with great relief to the patient; nor of cases wherein secondary conditions such as photophobia and premature presbyopia have disappeared under training. Nor of the numerous cases wherein the intelligence, or mental aptitude of the patient has been markedly improved by establishing more normal contact between the mind within and the world without.

The foregoing authentic cases have been cited merely to convince the reader of this series of the practical value of the principles and philosophy expounded in previous chapters.

In no case can anything be accomplished without the patient's cooperation and confidence. Confidence and cooperation are gained or lost during the first interview. No matter how worthy a service may be, its value can not be recognized if that service is poorly presented to the patient. Therefore, this series will close with a discussion of the psychological principles of presenting professional services.

OPTIPHOSIS; AND ITS CORRECTION

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New York, N. Y.

It is now considered essential for a refractionist to know as much about the action of light as he knows about eyes and the reaction of the eyes to light. There are two very interesting and significant differences between natural light and manufactured light which are apt to be overlooked, but which must now be taken into account if the patient is to receive a complete scientific service. First: Sunlight traverses a familiar cycle of gradually changing intensity; the intensity of artificial light remains fixed. Second: The outdoor worker and his work are surrounded by a diffused light; the indoor worker usually works with a light of fixed brilliance concentrated directly upon his work.

The human eye, naturally, has not had time to become fully adapted to all the new conditions of its use which have been created in the first century of the industrial age, therefore many ailments of the eye have resulted. So many in fact, that lighting engineers have found it necessary to classify them all under one general term. This newly coined term is Optiphosis, and the definition given in the Transactions of the Illuminating Engineering Society, of January, 1928, is: "Any defect of vision, ailment of the eye, or pathological disarrangement in the sight which has been caused by light," thus the modern refractionist is called upon not only to correct the errors of sight but also to correct the errors due to improper light. This can be done very adequately, with ophthalmic glass when it has been determined which element in light is most apt to harm the eyes.

In this paper, the writer is considering the use of the eyes under the ordinary conditions of light in which the majority of us live and work. What follows is not meant to apply to industrial work, such as glass-making, electric welding, etc., nor to ultra-violet therapy, both of which are special conditions requiring specific protective lenses, that would not be suitable in ordinary life.

Knowledge of the existence of the chemically-active ultra-violet and the heat-producing infra-red has caused a tremendous amount of confusion as to the need for protective lenses for these invisible radiations during the last twenty years. But, in general practice, little consideration has been given to the obvious ill effects of visible light.

Scientists who have made extensive laboratory studies of all phases of light radiation in recent years, have put the results of their investigations into books. One of the most recent being "Light and Health," by M. Luckiesh and A. J. Pacini. It is here recommended to all who are interested in obtaining a clear knowledge of the nature of light and its effect on human life, as well as on the eyes. The book may be found in the Science Department of the Public Libraries, or is obtainable from the publishers, William & Wilkins, Baltimore, for five dollars.

In order to dispose of one phase of this subject before facing another, let us see what our modern scientists are saying about ultra-violet and infra-red radiation in both sun and artificial light.

To date all scientists seem to agree that sun radiation of wave length shorter than 2,900 Angstrom units does not reach the earth. To quote Luckiesh and Pacini, "the sun's fiery mass emits much ultra-violet, but when the solar radiation reaches the surface of the earth, the shortest wave length measured is found to be about 2,900 A. This abrupt ending of the spectrum of solar radiation at the earth's surface is apparently due to the absorption due to ozone in the upper atmosphere.

Solar radiation becomes visible as violet, when diffracted at wave length 3,900 A. The octave of radiation between 3,900 A. and 2,900 A., called the ultra-violet, is the mysterious invisible radiation under suspicion. Now what part of this octave contains the chemically active rays? Verhoeff and Bell tell us that "the abiotic energy in the solar spectrum is a meager remnant between wave lengths 2,950 and 3,050." And "at high altitudes and in clear air" these rays are sufficient to produce slight abiotic effects such as are noted in snow-blindness and solar erythema.

The intermediate rays between the chemical rays and the visible light, of wave lengths 3,000 A. to 3,900 A. are called "near ultra-violet radiation." Of these rays, Luckiesh and Pacini comment as follows: "If the near ultra-violet (and near infra-red) are harmful to the eyes it is difficult to see why eye-trouble is not very prevalent among those who work outdoors a great deal of the time. Certainly no evidence of this is available.

When we consider the number of cloudy days in the year, in comparison with the number of days of brilliant sunshine, we must realize that we have all too little chance for exposure of ultra-violet radiation for our general health. The "sun-less" period of the year is said to extend from November until May. New York City has five sunlight recording machines to register the degree of sunlight the city receives in the winter months, and the amount it is cheated of by smoke and dust the year round. One recent report stated that for the greater part of the winter the "life-giving, health-bringing ultra-violet rays have been unable to penetrate the pall of smoke that lies over most of the five boroughs."

A simple test of the amount of ultra-violet radiation in daylight may be made by exposing the hands and face. If sunburn results there has been present ultra-violet radiation of wave length 3,020 or shorter.

Helio-conjunctivitis, which is a sort of "sunburn" of the exterior membranes of the eyeball, following prolonged exposure to intense sunlight, is sometimes said to be due to the near ultra-violet rays of perhaps longer wave lengths than 3,020. However, it is our common experience that though we quickly sunburn we are not simultaneously afflicted with conjunctivitis. And if ultra-violet radiation of wave lengths longer than 3,020 can cause inflammation of the unprotected eye, logically helio-conjunctivitis should be even more common than sunburn, since these feebler rays grade closely into the "light of common day."

In those seasons and climes in which intense sunshine prevails it is certainly a wise precaution to wear lenses that are opaque to the potent chemical rays and at the same time give the needed protection from the physiological and psychological discomforts of glare.

As to the interior of the eye, Luckiesh states that "the lens absorbs radiations shorter than wave length 3,500." Therefore a healthy eye may be assumed to contain its own natural protective medium against any chemically active radiation which may exist in ordinary light.

Whether the transparency of the crystalline lens is affected by the absorption of either ultra-violet or infra-red radiation during the course of a lifetime is a question that seems to be answered by the fact that cataract is not a universal affliction, that it is least prevalent in nations of good vitality, and that it is most common in India, Mexico, Labrador and other countries in which a large proportion of the population exists in a lifelong state of malnutrition.

Sick people, and people of low vitality are hypersensitive to light. It is obvious that all these people, in every country, would be benefited by glasses which reduce light and absorb chemically active radiation. Even healthy, robust people living in southern countries where brilliant sunshine prevails, or in the north where snow prevails, would be wise to wear protective glasses. It is noteworthy that experienced travelers and explorers in these regions do take this precaution.

Steinmetz, writing on the ultra-violet radiation of artificial illuminants, stated: "If, as is always the case, the illuminant is enclosed in glass, the harmful effect of these long ultra-violet rays is negligible." So it seems that in artificial light we have the protection of this glass envelope, and also the eye's own protective mediums. And when we put on glasses we have a third wall of protection for the retina. Luckiesh states that most clear, colorless glasses begin to absorb at about wave length 3,500 and absorption rapidly increases with the decreasing wave length, "the glass generally becoming opaque at about 3,000 or at slightly longer wave length."

If we accept the findings of these two authorities then we must conclude that ordinary eye glass lenses afford sufficient protection from actinic radiation under ordinary conditions of life.

Then what is the cause of the increasing prevalence, within recent years, of the numerous ailments now classified under the general term Optiphosis, such as photophobia, aesthenopia, photesthesia, etc? The answer is: Intensive work under conditions of illumination unnatural to the eye; uneven distribution of illumination, creating perceptible contrasts of light and shadow.

A candle light placed so that the light impinges directly upon the eye, in an otherwise dark or dimly lighted room, will cause discomfort and, if in close use long enough, will cause retinal exhaustion and inflammation. Unshaded kerosene lamps and electric lamps with clear glass globes produce the same effect of concentrated brightness in surrounding shadows. Even exposed frosted lamps are glaring, and can cause discomfort and eye fatigue.

Unshaded side lights do not directly impinge upon the eye but nevertheless the eye is conscious of them, causing a distraction of visual energy that hastens fatigue.

In our homes we can, if we study how, control the illumination to suit our individual physiological and psychological requirements. But how many people do? Lighting engineers tell us that 25% of the electric filament lamps in homes are used without shades, and that about half the number of shades in use do not adequately shade or diffuse the light.

At work in factories and offices the majority of people cannot control the illumination provided for them. Even in schools, the children are quite helpless to defend themselves from disturbing contrasts of dim light and scattered spots of brightness, which may be why we learn the habit of squinting and scowling at an early age and accept glare as an unavoidable discomfort throughout life.

Speaking of the advance in light production in the past twenty years, Luckiesh stated that although other parts of the body mature normally under artificial lighting conditions it has been convincingly proved that the eyes develop less effectively under "better" lighting conditions. This, he stated, was due to inadequate light and the improper use of light.

Inadequate light, or the dimming of available light, is apt to be the result of an effort to escape light of uncomfortable brilliancy. Lighting experts all agree that what is needed is more light and less glare. Recognizing this condition, they have provided industrial and school lighting codes with regulations against glare.

Glare, while it is as ancient as light itself, has only become a serious menace to man's eyesight under the artificial conditions of modern civilization. Scientists describe for us at least three different degrees of glare: Veiling glare, dazzle glare, and blinding glare.

Veiling glare, or veiling brightness, is described by Luckiesh as

light more or less uniformly superimposed on the retinal image, thus reducing contrasts and, hence, visibility. The veiling effect is commonly seen on glossy paper reflecting light with such dazzling effect that the type seems to fade and become less visible. The same effect —"a foggy picture"—is obtained when the sun shines into a camera.

Dazzle glare is described as any light within the field of view of such excessive brightness as to interfere with vision and become distracting, discomforting, or even painful. Reflected, or veiling glare, may be dazzling.

Blinding glare is described as an over-exposure of excessive brightness on the retina, to which the eye cannot adapt itself. As, for instance, the direct glare of the sun, an approaching automobile or locomotive headlight, electric signs, or any excessive illumination. The eyes are temporarily blinded when one passes from a dark room into a brilliantly lighted one, or into bright sunshine. Reflected glare may also cause glare-blindness. As, for instance, long exposure to the dazzling whiteness of snowfields or glittering desert sands. Automobilists, after driving constantly for several days, frequently experience a temporary "blindness" or dimming of vision, due to retinal exhaustion, and normal visual acuity does not return until the dissipated photochemical substances of the retina have been restored.

Night-blindness has been known to follow a long motor drive facing the sun when it was near the horizon and consequently shining directly into the driver's eyes. Prolonged exposure to bright lights in the tropics and at sea is also said to be frequently followed by night-blindness.

Retinal exhaustion due to prolonged use of the eye in illumination of excessive brightness is a bleaching of the visual purple, which is supposed to be a photochemic substance necessary to vision and a protective agent against light.

Another effect of glare is the muscular strain of intense and continued contraction of the pupil. An interesting description of the effect of facing a glaring light for hours was written by a prisoner describing a court room scene: " * * * the lights above alternated light and dim; the judge appeared swollen to gigantic size, then seemed to shrink into a midget form."

Dr. Nelson Miles Black had described the general effects of glare as follows: "The lids are screwed up, the brows puckered, and the iris maintained in a state of constant contraction in order to exclude the light. The expenditure of nervous energy required to bring this protective mechanism into play tends to produce brain fire and drowsiness, while the fatigue induced by the constant muscular contraction makes itself manifest as discomfort in and about the eye. * * * This is especially marked when bright light is reflected upward into the eye, as when reading print upon paper having a high glaze. The same result is equally marked after a short time in a room brilliantly lighted artificially." We all know that glare exists; that it is unes-

capable in modern life. What optical practitioners do not all realize is that they hold the one answer to this problem—protective lenses.

Writing of protective lenses, Verhoeff and Bell stated that the chief usefulness of protective glasses lies not so much in their absorption of any specific radiation as in their reducing the total amount of light to the point where it ceases to be psychologically disagreeable or to be inconveniently dazzling. A "white" lens may cut off radiation at the ends of the spectrum, but it gives no relief from excessive brightness.

It therefore becomes the duty of the refractionist to fully investigate the various colored lenses available and to incorporate the use of color in his ocular prescriptions for patients who are suffering from nerve exhaustion or optiphosis, due to glare.

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SCHERER CATARACT SPECTACLES TO IMPROVE DISTANCE VISUAL ACUITIES

In 1924[1] Dr. Charles M. Scherer, optometrist of Chicago published a discription of a type of Cataract Spectacles to improve the near-point vision of patients effected with senile nuclear cataract. Scherer using the known formula that the diameter of the pupil was proportionate to the amount of light which entered the eye, devised an opaque lens with a 10 *mm.* round clear reading area. This lens to be placed in a protection glass frame, with side shields so fitted as to entirely eliminate all side-light from entering the eye. The opaque interior of the lens was covered with black enamel to further reduce the amount of light which reached the eye. The spectacles were so adjusted as to place the 10 *mm.* clear round reading area in direct line of vision. Senile nuclear cataract patients using this contrivance were frequently found to read far better with it than with ordinary spectacles of the same strength, the reason being that with the Scherer Cataract Spectacles in place the pupils shortly became enlarged, thus permitting the patient to use the clearer areas of the Crystalline lens around the lenticular opacity for reading. These glasses, however, were unsuited for distance vision for two reasons, first, the field was too small, and second, its position was such as to enable the patient to only view objects materially below the eye level, *i. e.,* such things as would naturally be held in the hands.

To apply this reading principle of Scherer's to the distance problems of these patients, the writer has had made a similar type of spectacle in a side shield protection glass frame, the apparatus having, however, instead of a 10 *mm.* round appature as did Scherer's, a horizontal strip of clear glass, 20 *mm.* in length and 5 *mm.* in width, combined with a vertical strip of clear glass, 20 *mm.* in height, extending from a point 5 *mm.* above the horizontal strip of clear glass to a point 10 *mm.* below it, this vertical strip also being 5 *mm.* in width, and being so placed that it bisects the horizontal strip, this point of bisection being centered directly before the pupil of the patient. The idea is similar to that used by the Eskimos who make a somewhat similar contrivance out of bone to protect their eyes from snowblindness.[2] These distance cataract spectacles, when carefully centered, while giving the patient a decidedly limited field, do, however, enable them to get about fairly well with a marked improvement of vision. C. C. K.

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THE USE OF ENTOPTIC PHENOMENON TO DEMONSTRATE THE PRESENCE OF LENTICULAR OPACITIES.

As a subjective experimental test to determine the presence or absence of opacities of the crystalline lens, the following procedure is of interest, although naturally not to be advised in place of a more thorough ophthalmoscopic examination of the lens structures.

The technic is as follows: The patient is seated, facing at six meters, a small round light diaphragm, well illuminated internally by an electric light globe. The aperture used should be from three-fourths of an inch to an inch in diameter. The type of light frequently used in making a phoria test will serve nicely. Now assuming that the test is to be made on the right eye, the left eye would then be securely bandaged and the patient instructed to hold a plus 8. D. Spherical lens before the right eye, in such position as to give the patient the appearance of the light entirely covering the lens surface. The patient then watching the brightly illuminated lens area will see the lenticular opacities standing out in bold relief as though on the lens. It is important of course to give the patient an arm rest, as the lens must be held out of focus for the light, it being held some 12 to 15 centimeters from the eye.

The test applies the principles of entoptic phenomenon and is sometimes useful in showing patients their lenticular opacities, should one wish to do so. C. C. K.

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This paper covered volume is divided into three portions, each consisting of a lecture delivered at the thirty-first annual Congress of the A. O. A. held during July of this year at Grand Rapids, Michigan. The papers are published in the following order:

Modern Muscle Training. W. B. Needles. p. 3-20.

Needles reviews the physiology of the ocular muscles and compares the universally accepted theories of muscular treatment with some of the newer developments of optometric thought pertinent to ocular myology. This is a well written conservative exposition of the tests to be made and the prismatic therapy to be employed. Several paragraphs are devoted to oculo-prism therapy and to version exercise.

A Routine Refraction. C. C. Koch. p. 21-87.

Koch divides a refraction into two parts, the first consisting of the history taking and all of the objective tests, the second or the Post-Refraction consisting of the subjective tests along with a recheck of some of the objective tests. The routine refraction as suggested by him is carried on as follows: Case History; Visual Acuity Uncorrected; The Cover Test; Uncorrected Phoria Test; Versions; External Ocular Inspection; Ophthalmoscopic Examination; Sphygmomanometer Findings; Transillumination; Color Tests; Perimetry and Campimetry; Ophthalmometric Findings; Skiametry Static and the First Dynamic Skiametric Check Test.

The Post-Refraction routine is as follows: Skiametry Static; the Second Dynamic Skiametric Check Test; Monocular Cross Cylinder Accommodative Test; the Corrected Subjective Distance Acuity of Vision Test; the Dominant Eye Test; Distance Comparison Test; the Determination of the Patients' Visual Working Range; the Third Dynamic Skiametric Check Test; Near Point of Accommodation; Subjective Positive Accommodative Test; Subjective Near-Point Addition; Corrected Distance Phoria Test; Corrected Near-Point Phoria Test; Distance Duction Tests; Near-Point Duction Tests and the Binocular Accommodative Convergence Cross Cylinder Test.

The value of these routine tests in an ocular examination, their relationship, the methods of employing them and finally the diagnostic value of the findings are first reviewed by Koch in this paper. He next reviews a number of hypothetical cases each illustrating one or more of the various types of refractive defect, giving his own

and also the views of others in the matter of the specific therapy to be employed. Eight pages are given over to a most complete record chart, the paper being concluded with a bibliography giving 89 references.

Some Types of Binocular Balance. R. M. Peckham. p. 89 134.

Peckham's theories during recent years have been widely published, but this short thesis giving his latest views, probably more clearly than anything else he has written recently, outlines his beliefs on the subject of ocular myology.

Peckham reviews first, some of the systemic disorders of the system which frequently will upset the convergence-accommodative balance. He follows this with an exposition of his views on exophoria, esophoria and hyperphoria, giving the etiology, treatment and prognosis of each. The use of plus corrections and prisms is gone into and he reviews the treatment suggested by himself for latent hyperopia and myopia. A number of cases are briefly cited illustrating his technic. It is to be regretted that more of the refractive data as gathered with each case was not published with this paper, which does not lend itself to abstracting or reviewing, but rather must be fully read to be appreciated, as so much of importance is covered in such a relatively short space.

T. O. B.

PRACTICAL GUIDE FOR CHARTING AND INTERPRETING THE VISUAL COLOR FIELDS. William Arthur Mendelsohn, Oph.D. Published by the Professional Recording Co., Chicago, Ill. 82 Pages, 20 Color Plates. 1928. Price, $5.00.

The Practical Guide for Charting and Interpreting the Visual Color Fields compiled by Dr. William A. Mendelsohn is in a class by itself. While the book is small, containing only 82 pages, it is full of practical information on the subject expressed in its title.

Other books on this subject are usually full of discussions pertaining to pathological conditions thus making it difficult for the refractionist at times, to grasp the points of importance. This, the author has carefully avoided in confining himself to practical facts and interpretation of the conditions of different fields, which may be of interest to the optometrist from a physiological rather than a pathological standpoint.

This book was compiled with the view of assisting the refractionist in studying the fields and thus be able to better determine and correct his cases of "muscular imbalance." Also to enable him to note the progress of the "ocular training." The author stresses the point that this work was compiled from practical experience and

consultations with other members of the profession who have made special study of the subject.

The book is made up of eight parts. The first part deals with the myoculator technique for taking the visual form and color fields. In the second part the author tells when color field charting is indicated. He maintains that in some cases pathological conditions will be revealed by charting the color fields in spite of the fact that the ophthalmoscopic examination may be negative. The point of interest from a diagnostic standpoint is the fact that a restriction of color field limits in the vertical meridian, claims Mendelsohn, is an indication of the presence of a lateral muscular imbalance, and that these limits will enlarge, returning back to normal as the imbalance has been removed through training only and not by correcting the imbalance through the use of correcting prisms.

In parts 4, 5, and 6, the author discusses the involvement of the green, red and blue fields contending that a contraction of the red field is an indication of a general systemic toxemia, the author devotes some special attention to discussing the causes responsible for toxemia. Wrong food combinations, he claims, would be one of the most important causes and discusses the food chemistry, also gives some tables of practical food combinations.

Toxic amblyopia and its effect on the color form fields is discussed in part seven and some pointers of what particularly to look for in taking the form and color field is discussed in the last part. There are also given a number of diagrams in four colors showing the restrictive color fields under certain abnormal conditions, as well as diagrams with these color fields normal or nearly normal when the defective condition has been removed.

This book is unique inasmuch as it is not a product of the printing press but is rather put out through a special process, the print somewhat resembling splendidly gotten together typing.

J. I. K.

INTERIM REPORT OF THE RESEARCH COMMITTEE OF THE INSTITUTE OF OPHTHALMIC OPTICIANS. Owen Aves, F. B. O. A. (Hons). Published by the Institute of Ophthalmic Opticians. 428 Bank Chambers, 329 High Holborn, London, W. C. 1. 48 pages. Illustrated. July, 1928.

Aves has divided this report into four sections. The first deals with what he chooses to call Internal Research. By this he refers to research work done by refracting ophthalmic opticians at the Refraction Hospital, and by the Research Committee of the staff of instructors at the Northampton Polytechnic Institute and the West Ham Higher Educational Committee.

The Internal Research for the period covered in this report is divided by Aves into five parts, the first dealing with *The Peri-*

pheral Acuity for Snellen Letters (p. 10). Experimental work disclosed the fact that when the image was four degrees off the macula the Snellen acuity was but 26% of normal. Five degrees off lowered it to 23%; 6 degrees to 19%; 8 degrees to 15%; 10 degrees to 12½%; and 12 degrees to 11%. The second research deals with, *The Speed of Response With Moving Objects in Peripheral Parts of the Fields.* (p. 11). In this research the time which elapsed from the moment a moving object in the peripheral field was seen until a moving drum could be stopped by means of a lever in the hand of the observer, was measured. Aves draws the following conclusions: "(I) The observer responds more quickly to visual impressions at the center of the field (0°) than elsewhere. The average time increases from about 0.19 second at the center of the field to about 0.75 second at the extreme temporal limit for a black object on a gray background. (II) The time to respond increases when the general illumination is reduced and when the contrast between the moving object and the background is decreased. (III) The time to respond decreases with increase in dimension of the object perpendicular to the direction of its motion. (IV) The effect of visual acuity appears to be very small, the time changing but little with visual acuities varying from Snellen 6/4 to 3/30." Number four is interesting as it would indicate that reasonably subnormal visual acuity has little effect on safe driving on the part of motor car operators. The third research deals with *The Arrangement of Letters for a Standard Subjective Test Chart* (p. 14). The object of this inquiry was to review the work already carried out by other investigators in this field and arrive at a standard arrangement of the test characters. The results of their investigations are as follows:

Suggested Standard Test Chart: Arrangement of Letters

Distance for Unit Acuity in Meters	*Acuity if Observer Reads—* *Half Line*	*Full Line*	*Letters Suggested*
60	..	0.1	L V H W
30	..	0.2	T F N K H M
20	..	0.3	A U V C D G
15	..	0.4	J L F E H K M W
12	..	0.5	A L V U O D G O
10	..	0.6	T J N F Y X S R
7.5	0.7	0.8	L T F V K H W M
6	0.9	1.0	A J E F D O Q G
5	1.1	1.2	F L V J P Z B R
4.33	1.3	1.4	J L F E K H M W
3.75	1.5	1.6	L V A U D O Q G
2.5	1.8	2.0	N L F V H K W M

The fourth research deals with *The Best Range of Illumination for Astigmatic Charts* (p 16). The charts used were single black line fan charts on a white background and the experimental work

carried out disclosed the fact that best results were obtained with from 1 to 10 foot candles of illumination on the surface of the chart. The fifth research consisted of a *Comparison of Existing Fan Charts in Testing Astigmatism* (p. 17). This report is incomplete as the work is but partially finished. Five charts are being investigated, a full report on these to be published later.

The second section deals with what Aves terms external research. This section is principally taken up with the abstracted reports of three technical communications which were submitted to the research committee. The first communication, *Analysis of Powers and Axis Direction of Lenses Supplied to School Children, Ages Included.* O. Aves (p. 24), with analysis by external director and the second, *Refractive Errors in School Children* by the external director (p. 31) are in this report largely statistics regarding the age distribution of refractive defects; the percentages of each type of defect; the variations of astigmatism, with and against the rule; data relative to those children requiring only spherical corrections, and tables regarding percentages of visual acuities. The third communication deals with a *Preliminary Note on Measurements of the Related Head, Eye and Body Movement.* G. O. Aves and H. K. White (p. 35).

The third section deals with three reports from the Refraction Hospital, London. The first of these deals with local anaesthetics (p. 37), the aim being to find proper substitutes for cocaine. The second deals with an analysis of the cases refracted at the hospital (p. 39) and the third with a splendid detailed report of the Effect of Orthoptic Exercises on a Case of High Divergence and Aphakia (p. 37-42). In this case, a divergent squint of ten years' standing is cured by means of prisms and fusional development.

The last section deals with a description of the *Fiacham Combined Corneal Microscope and Slit Lamp* (p. 43); *The Deviograph of Aves* (p. 44) and the *Turville-Stewart Combined Ophthalmoscope, Slit Lamp, and Retinoscope* (p. 45), each being illustrated.

This small, well arranged paper covered book is splendidly filled, by the author, with the various researches now engaged in by British optometrists, these indicating a spirit of development which will be beneficial to all refractionists. A. J. Esdaile as Chairman of the Research Committee has prefaced the work with a short foreword outlining the present and future plans for the continuance of this type of research. C. C. K.

ANNOTATIONS AND SOCIETY PROCEEDINGS

The American Journal of Optometry is the official Organ of the American Academy of Optometry, as well as the Organ of the Arkansas, Delaware, Iowa, Maine, Maryland, Michigan, Minnesota, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Dakota, Vermont and West Virginia Optometric Associations.

The following gentlemen have consented to supply items of interest from their respective sections, acting in the capacity of

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$40,000 SUBSCRIBED FOR RESEARCH

Owen Aves, F. B. O. A. (Hons), secretary of the Research Committee of the Institute of Ophthalmic Opticians of England, writes as follows: "I do not know whether the Institute of Ophthalmic Opticians' Staff have sent you a copy of the Interim Report of the Research Committee but as I promised to do so I am enclosing one herewith. I shall be very pleased if you can find room for report and comment on the work which has been successfully inaugurated during the last year."

This book is reviewed in this issue of the AMERICAN JOURNAL OF OPTOMETRY.

He continues: "As a matter of fact a very great deal more work has been done than is actually included in the present publication but as all three of our Directors of Research are men who are very particular that reports should not be issued until a very great deal of supporting evidence has been obtained, a number of communications have been withheld until more investigation has taken place.

"It may interest you to know that although we have no registration in this country a great amount of interest is being taken in the development of research work and the foundation of other Refraction hospitals on the lines of the London Refraction Hospital. Over £8,000 has already been promised during the past year as a voluntary subscription by members of the Institute toward these objects."

£8,000 or $40,000 has, according to Mr. Aves, been subscribed during the last year by optometrists, for research and educational purposes in England.

How wonderful this is—and how encouraging—yet how backward it does make us feel here in the States when we note the struggle the Cross Memorial Fund Commission is having in raising but $5,000 and when we contemplate the piffling $250 appropriated by the A. O. A. for educational purposes. We may have the organizations and the Optometry Acts, but we sometimes cannot but help feeling that too much of their energy is, at times at least, misdirected.

C. C. K.

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A SIXTEEN PAGE RECORD CHART

Dr. Paul Dill, optometrist of Greeley, Colorado, sent us for review, a sixteen-page record chart for use in permanently recording refractive data. The chart is so bound as to enable Doctor Dill to use the same chart for not only the first but also for several subsequent examinations. Adequate space is permitted to record every detail of a thorough ocular examination and in addition to this two pages are given over to a detailed record of oculo-prism therapy. This is, without a doubt, the most elaborate record chart we have seen and should more than prove its worth to its maker.

* * * *

GRADUATE WORK AT SALT LAKE CITY

Dr. E. E. Keller, optometrist of Salt Lake City, Utah, reports that the recent week of graduate work conducted by Utah Optometrists under the direction of Dr. A. M. Skeffington was a splendid success. Daily clinics were held, every effort being made to make the work as practical as possible. Optometrists in attendance voted to hold a similar week, next year.

* * * *

PENNSYLVANIA STATE BOARD

The following optometrists were successful in passing the standard examination given by the Pennsylvania State Board of Optometry the later part of June. Dr. G. D. Wengert, 343 S. 16th St., Harrisburg; Dr. E. S. Lowry, Uniondale; Dr. J. Saturen, 309 N. Marshall St., Philadelphia; Dr. H. W. Owens, 515 Crest Ave., Charleroi; Dr. J. M. Musiano, 12 Central Ave., Hammonton, N. J.; Dr. W. H. Nicklin, 114 Hoffman Ave., Trenton N. J.; Dr. F. W. Titus, 7 W. Washinton St., Bradford; Dr. H. H. Bisbee, 301 Radcliffie St., Bristol; Dr. A. H. Borland, 527 E. Fulton St., Buttler; Dr. A. E. Leuze, 3325 N. 20th St., Philadelphia.

* * * *

THE SEVENTY-FIFTH ANNIVERSARY

The manufacturing firm of Bausch and Lomb are celebrating their seventy-fifth anniversary. Mr. John Jacob Bausch and his partner, Mr. Henry Lomb formed a partnership 75 years ago, this month, as opticians in Rochester N. Y. The firm is still in the hands of these families, they now specializing

in the manufacturing of optical material and scientific instruments. They are reputed to be the only makers of ophthalmic glass in America.

* * * *

NORTH DAKOTA CONVENTION

The twenty-sixth annual convention of the North Dakota Optometric Association was held at Jamestown. The president, Dr. H. Kornmesser, reviewed the association activities of the past year laying special emphasis on the educational publicity carried on by the association among the teachers and school children of that state.

Dr. J. C. Copeland of Chicago lectured on retinoscopy and cross cylinder tests and A. R. Schrader spoke on the importance the modern instruments play in optometric practise.

The following men were elected as officers for the next year: Drs. L. G. Power of Minot, president; A. E. Anderson of Towner, first vice-president; C. P. Elliott of Valley City, second vice-president; Andrew Lee of Carrington and A. S. Anderson of Williston were reelected treasurer and secretary, respectively.

A MOVE

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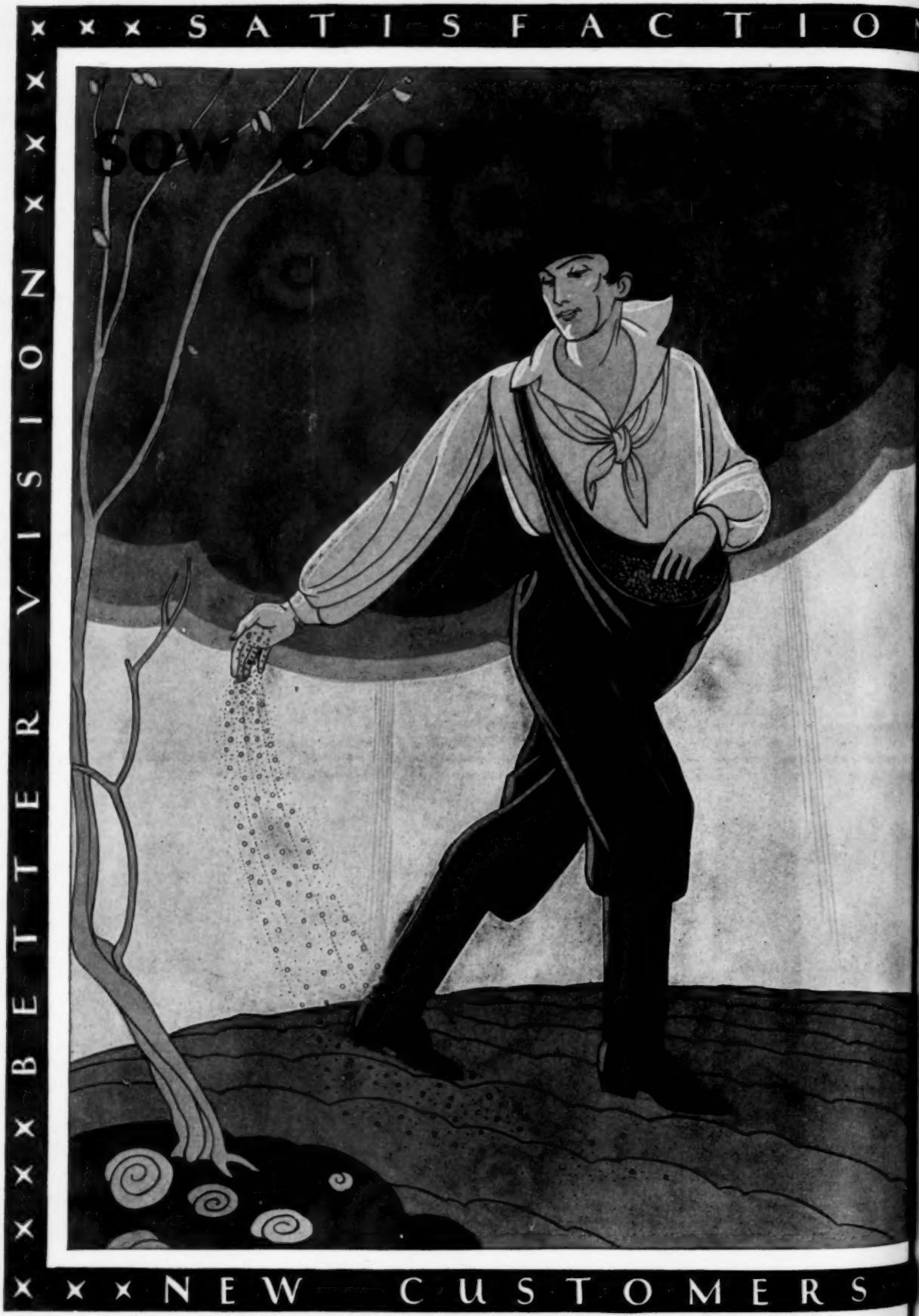
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